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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/601,958	08/10/2000	JYOTI KIRON BHARDWAJ	WLJ.056	5262

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EXAMINER

HASSANZADEH, PARVIZ

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 10/23/2002

13

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/601,958

Applicant(s)

BHARDWAJ ET AL.

Examiner

Parviz Hassanzadeh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 September 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 and 26-49 is/are pending in the application.
- 4a) Of the above claim(s) 3,5,10,11,16-20,22-24 and 29-49 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,6-9,12-15,21 and 26-28 is/are rejected.
- 7) ☒ Claim(s) 1, 27 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 August 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4,6,7.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Species 1, Group 1, claims 1, 2, 4, 6-9, 12-15, 21 and 26-28 in Paper No. 12 is acknowledged.

Claims 3, 5, 10, 11, 16-20, 22-24 and 29-49 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Species and method, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 12.

Specification

This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

The disclosure is objected to because of the following informalities:

it is suggested to change "utilise, optimisation, homogenising, energized, localise" to "utilize, optimization, homogenizing, energized, localize" through the entire of the specification; on page 22, line 11, it is suggested to delete "a" after "grid" and insert "a" before "grid"; on page 25, line 17, it is suggested to delete "may" after "alternatively"; on page 31, line 19, it is suggested to insert a blank space between "17A" and "consists".

Appropriate correction is required.

Claim Objections

Claim 1 is objected to because of the following informalities: it is suggested to change "homogenising" to "homogenizing". Appropriate correction is required.

Claim 27 is objected to because of the following informalities: it is suggested to change the dependency of the claim from 25 to 26 since claim 25 has been cancelled. Appropriate correction is required.

Claim Rejections - 35 USC § 112

Claims 1, 2, 4, 6-9, 12-15, 21 and 26-28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1, line 6 and in claim 26, line 5, the word "radical" generally means an atomic or molecular species having at least one unpaired electron and the radical species may be neutral, positively charged or negatively charged. it is suggested to insert "neutral" before "radical".

In claim 21, line 3, "field" is vague as it may mean electrical or magnetic; it is suggested to insert "magnetic" before "field".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 4, 6, 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Amemiya et al (EP 0488393 A2).

Amemiya et al teach a plasma processing apparatus (Fig. 2) comprising:
a chamber 14 having a section 24 at which a wafer 2 is supported on a wafer mount 23
and an upper section 25 at which a plasma is generated from a gas introduced via an inlet gas 31

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by *high frequency electrodes 28a, 28b (means for striking a plasma in a chamber having a gas inlet and a support for a substrate)*; and

an *ion trap 38* for trapping ions in the plasma to send neutral radicals into the wafer treating section 24 (*attenuation means for reducing and/or homogenizing the ion flux from the plasma substantially without affecting the neutral radical number density*) (abstract and column 4, line 47 through column 5, line 35).

Regarding claim 2: means for providing alternating etch and deposition step is interpreted as etching and deposition gas sources which are considered process limitations rather than structural limitation and the etching apparatus of Amemiya et al (column 5, lines 8-16) is inherently capable of being used for a deposition process.

Regarding claim 4: the upper section 26 is made of quartz (dielectric material) (column 5, line 1).

Regarding claim 6: the electrodes 28a, 28b are wound around the quartz tube 26 of the upper section 25 (column 5, lines 4-7).

Claims 1, 2, 4, 6-9, 12, 21, 26-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Ohkawa et al (EP 0831516 A2).

Ohkawa et al teach a plasma processing apparatus (Fig. 1) comprising:

a vessel 12 defining a chamber 28 having a substrate 26 supported on a pedestal 24 and having a plasma 48 generated therein from a gas introduced therein via an inlet gas (not shown) through propagating radio-frequency power into the chamber via an antenna 22 (*means for striking a plasma in a chamber having a gas inlet and a support for a substrate*); and

a magnet 30 generating magnetic field parallel to the surface of the substrate for trapping ions in the plasma to send neutral radicals into the substrate (*attenuation means for reducing and/or homogenizing the ion flux from the plasma substantially without affecting the neutral radical number density*) (abstract and column 6, line 19 through column 8, line 2).

Regarding claim 2: means for providing alternating etch and deposition step is interpreted as etching and deposition gas sources which are considered process limitations rather than structural limitation. Further the apparatus of Ohkawa et al can be used for etching as well as for deposition (column 6, line 54).

Regarding claim 4: the vessel 12 is made of an insulating material (dielectric material) such as glass (column 6, lines 19-31).

Regarding claim 6: the antenna 22 is disposed above the vessel 12 (column 6, lines 32-44).

Regarding claim 7-9, 12, 21, 27, 28: the magnetic field may be produced by a permanent magnet or an electro-magnetic device (column 7, lines 2-16).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

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evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ohkawa et al (EP 0831516 A2) in view of Kin (JP61-39521 A).

Ohkawa et al teach all limitations of the claims as discussed above except for the attenuation means (magnetic generating filed) comprising a tubular member carrying magnets.

Kin teaches a plasma processing apparatus including a pole-like electrode 101 having a plurality of magnets 103, 104, ... embedded therein wherein the electrode is inserted inside a plasma chamber 110 (abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the magnetic arrangement as taught by Kin in the apparatus of Ohkawa et al in order to protect the magnets from plasma when the magnetic field generating device is disposed inside the plasma chamber.

Claims 14, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohkawa et al (EP 0831516 A2) in view of Ribeiro (US Patent No. 4,769,101).

Ohkawa et al teach all limitations of the claims as discussed above except for the attenuation means (magnetic generating filed) comprising a tubular member carrying magnets.

Ribeiro teaches a plasma processing apparatus (Fig. 1) including a magnet coil 51 cooled by a cooling system 52 having a cooling-fluid line 53 (column 6, lines 22-33).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to implement cooling mechanism as taught by Ribeiro in the apparatus of Ohkawa et al in order to control the temperature of the magnets particularly if it is desired to dispose the magnets inside the chamber.

Claims 14, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohkawa et al (EP 0831516 A2) in view of Maeno et al (US Patent No. 6,060,836).

Ohkawa et al teach all limitations of the claims as discussed above except for the attenuation means (magnetic generating filed) comprising a tubular member carrying magnets.

Maeno et al teach a plasma processing apparatus (Fig. 1) including permanent magnets 40 cooled by a water-cooled structure comprising a cooling water passage (not shown) within the central conductor 22 in order to remove heat generated by plasma and thus to protect the magnets (column 5, lines 60-65).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to implement cooling mechanism as taught by Maeno et al in the apparatus of Ohkawa et al in order to remove heat from the magnets particularly if it is desired to dispose the magnets inside the chamber.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Lagarde et al (US Patent No. 6,403,490 B1) teach a plasma reactor including a series of magnets disposed between two parallel electrodes for oscillating electrons between magnetic poles;

Watanabe (JP 2-118055 A) teach a plasma reactor including a magnet 11 cooled by a cooling mechanism as shown in Fig. 1.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Parviz Hassanzadeh whose telephone number is (703)308-2050. The examiner can normally be reached on Tuesday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on (703)308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9310 for regular communications and (703)872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0661.

P. Hassanzadeh
Parviz Hassanzadeh
Examiner
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October 16, 2002